

Patent Application Docket No: UF-10488R

What is claimed is:

- 1. Biocompatible particles for delivery of a vaccine to the *pulmonary* system comprising
- an immunizing agent; wherein the particles have a tap density less than 0.4 g/ml and at
- least 90% of the particles have geometric dimensions between about 5 μm and about 30
- 4 μm.
- 2. The particles of claim 1 wherein the immunizing agent is selected from the group
- 2 consisting of a live attenuated virus or bacterial vaccine, a recombinant virus or bacterial
- ³ vaccine encoding an immunizing antigen or a combination of antigens against which
- elicitation of an immune response is desired, and an inactivated virus or bacterial vaccine.
- 3. The particles of claim I combined with large biodegradable carrier particles having a
- 2 mass mean diameter in the range of about 50 .mu.m to about 100 .mu.m.
- 4. The particles of claim 1 combined with a pharmaceutically acceptable carrier for
- 2 administration to the respiratory tract.
- 5. The particles of claim 1 wherein at least 90% of the particles have a mass mean
- diameter between about 5 .mu.m and about 15 .mu.m.
- 1 6. The particles of claim 1 wherein at least 90% of the particles have a mean diameter
- between about 9 .mu.m and about 11 .mu.m.
- 7. The particles of claim 1 wherein at least 50% of the particles have a tap density of less
- 2 than 0.1 g/cm.sup.3.
- 8. The particles of claim 1 wherein the particles further comprise a polymeric material.
- 9. The particles of claim 1 wherein the particles further comprise a non-polymeric
- 2 material.
- 1 10. Biocompatible particles for delivery of a targeting molecule to the *pulmonary* system
- wherein the targeting molecule is attached to the particles and wherein the particles have





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a tap density less than 0.4 g/cm.sup.3, and at least 90% of the particles have geometric dimensions between 5 .mu.m and about 30 .mu.m.

- Biocompatible particles for delivery of a vaccine agent to the pulmonary 11. system comprising an immunologically effective amount of a vaccine agent; wherein the particles have a tap density less than 0.4 g/cm.sup.3 and at least 90% of the particles have an aerodynamic diameter between about 1 .mu.m and about 5 .mu.m.
- The particles of claim 11 wherein the agent is selected from the group 12. consisting of viral vaccines, bacterial vaccines, live, attenuated, recombinant, inactivated, and combinations thereof.
- The particles of claim 11 combined with large biodegradable carrier particles 13. having a mass mean diameter in the range of about 50 .mu.m to about 100 .mu.m.
- The particles of claim 11 combined with a pharmaceutically acceptable carrier 14. for administration to the respiratory tract.
- The particles of claim 11 wherein at least 90% of the particles have an 15. aerodynamic diameter between about 1 .mu.m and about 3 .rnu.m.
- The particles of claim 11 wherein at least 90% of the particles have an 16. aerodynamic diameter between about 3 .mu.m and about 5 .rnu.m.
- The particles of claim 11 wherein at least 50% of the particles have a tap 17. density of less than 0.1 g/cm.sup.3.



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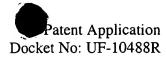
- The particles of claim 11 wherein the particles further comprise a polymeric 18. material.
- The particles of claim 11 wherein the particles further comprise a non-19. polymeric material.
- Biocompatible particles for delivery of a vaccine and targeting molecule to 20. the pulmonary system wherein the targeting molecule is attached to the particles and wherein the particles have a tap density less than 0.4 g/cm.sup.3, and at least 90% of the particles have an aerodynamic diameter between about 1 .mu.m and about 5 .mu.m.



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- 21. A method for delivery of an actively immunizing amount of a vaccine to the
- 2 pulmonary system comprising: administering to the respiratory tract of a patient in need
- thereof of an effective amount of biocompatible particles incorporating said vaccine,
- 4 wherein the particles have a tap density of less than about 0.4 g/cm.sup.3 and at least
- 5 90% of the particles have geometric dimensions between about 5 .mu.m and about 30
- 6 .mu.m.
- 1 22. The method of claim 21 wherein the agent is selected from the group consisting
- of viral vaccines, bacterial vaccines, live, attenuated, recombinant, inactivated, and
- 3 combinations thereof
- 1 23. The method of claim 21 wherein the particles are combined with large
- 2 biodegradable carrier particles having a mass mean diameter in the range of about 50
- 3 .mu.m to about 100 .mu.m.
- 24. The method of claim 21 wherein the particles are combined with a
- 2 pharmaceutically acceptable carrier for administration to the respiratory tract.
- 25. The method of claim 21 wherein at least 90% of the particles have a mass mean
- 2 diameter between about 5 .mu.m and about 15 .mu.m.
- 26. The method of claim 21 for delivery to the alveolar zone of the lung wherein at
- 2 least 90% of the particles have a mean diameter between about 9 and about 11 .mu.m.
- 1 27. The method of claim 21 wherein at least 50% of the administered particles have
- a tap density of less than about 0.1 g/cm.sup.3.
- 1 28. The method of claim 21 wherein the particle's further comprise a polymeric material.
- 1 29. The method of claim 21 wherein the particles further comprise a non-polymeric
- 2 material.





- 30. A method for delivery of a vaccine and a targeting molecule to the *pulmonary*
- 2 system comprising: administering to the respiratory tract of a patient in need of
- treatment, prophylaxis or diagnosis an effective amount of biocompatible particles,
- 4 wherein the particles have a tap density less than about 0.4 g/cm.sup.3 and at least 90%
- of the particles have geometric dimensions between about 5 .mu.m and about
- 6 30 .mu.m, and wherein the targeting molecule is attached to the particles which further
- 7 comprise the vaccine.
- 1 31. A method for delivery of a vaccine to the *pulmonary* system comprising:
- 2 administering to the respiratory tract of a patient in need thereof of an effective
- 3 amount of biocompatible particles comprising said vaccine, wherein the particles
- 4 have a tap density of less than about 0.4 g/cm.sup.3 and at least 90% of the particles
- 5 have an aerodynamic diameter between about 1 .mu.m and about 5 .mu.m.
- 32. The method of claim 31 wherein the agent is selected from the group consisting
- of viral vaccines, bacterial vaccines, live, attenuated, recombinant, inactivated, and
- 3 combinations thereof.
- 1 33. The method of claim 31 wherein the particles are combined with large
- 2 biodegradable carrier particles having a mass mean diameter in the range of about 50
- 3 .mu.m to about 100 .mu.m.
- 34. The method of claim 31 wherein the particles are combined with a
- 2 pharmaceutically acceptable carrier for administration to the respiratory tract.
- 35. The method of claim 31 wherein at least 90% of the particles have an
- 2 aerodynamic diameter between about 1 .mu.m and about 3 .mu.m.
- 36. The method of claim 31 for delivery to the alveolar zone of the lung wherein
- at least 90% of the particles have an aerodynamic diameter between about 3 .mu.m
- 3 and about 5.mu.m.



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- 37. The method of claim 31 wherein at least 50% of the administered particles have
- 2 a tap density of less than about 0.1 g/cm.sup.3.
- 1 38. The method of claim 31 wherein the particles further comprise a polymeric
- 2 material.
- 39. The method of claim 31 wherein the particles further comprise a non-polymeric
- 2 material.
- 1 40. A method for delivery of a vaccine and a targeting molecule to the *pulmonary*
- 2 system comprising: administering to the respiratory tract of a patient in need of
- 3 treatment, prophylaxis or diagnosis an effective amount of biocompatible particles
- 4 comprising said vaccine, wherein the particles have a tap density less than about
- 5 0.4 g/cm.sup.3 and at least 90% of the particles have an aerodynamic diameter between
- about 1 .mu.m and about 5 .mu.m, and wherein the targeting molecule is attached to the
- 7 particles.